

# **OMPSNADIR Science Processing Algorithm (OMPSNADIR\_SPA) User's Guide**

**Version 2.6.9**

January 2020



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**GODDARD SPACE FLIGHT CENTER  
GREENBELT, MARYLAND**

## OMPSNADIR Science Processing Algorithm

### OMPSNADIR\_SPA

#### General

The NASA Goddard Space Flight Center's (GSFC) Direct Readout Laboratory (DRL), Code 619.1, developed this software for the International Planetary Observation Processing Package (IPOPP). IPOPP maximizes the utility of Earth science data for making real-time decisions by giving fast access to instrument data and derivative products from the NOAA-20 [Joint Polar Satellite System (JPSS)], Suomi National Polar-orbiting Partnership (SNPP), Aqua, and Terra missions.

Users must agree to all terms and conditions in the Software Usage Agreement on the DRL Web Portal before downloading this software.

Software and documentation published on the DRL Web Portal may occasionally be updated or modified. The most current versions of DRL software are available at the DRL Web Portal:

<https://directreadout.sci.gsfc.nasa.gov/?id=software>

Questions relating to the contents or status of this software and its documentation should be addressed to the DRL via the Contact DRL mechanism at the DRL Web Portal:

<https://directreadout.sci.gsfc.nasa.gov/?id=dspContent&cid=66>

#### Algorithm Wrapper Concept

The DRL has developed an algorithm wrapper to provide a common command and execution interface to encapsulate multi-discipline, multi-mission science processing algorithms. The wrapper also provides a structured, standardized technique for packaging new or updated algorithms with minimal effort.

A Science Processing Algorithm (SPA) is defined as a wrapper and its contained algorithm. SPAs will function in a standalone, cross-platform environment to serve the needs of the broad Direct Readout community. Detailed information about SPAs and other DRL technologies is available at the DRL Web Portal.

#### Software Description

The OMPSNADIR\_SPA software package processes Suomi National Polar-orbiting Partnership (SNPP) Ozone Mapping and Profiler Suite (OMPS) Level 0 Production Data Set (PDS) files into Level 1A (L1A), Level 1B (L1B) and Level 2 (L2) data products. The OMPSnadir algorithm takes as input eight files in Production Data Set (PDS) format, and produces nine output files: six data files in Hierarchical Data Format 5 (HDF5) format, and three .PNG images.

The L1B data products provide geolocated and calibrated radiances from the OMPS Nadir Mapper (NM) and Nadir Profiler (NP) instruments. The L2 products include an Ozone and a Sulfur Dioxide (SO<sub>2</sub>) product. The L2 Ozone product provides total column ozone and aerosol

index retrievals from normalized Nadir Mapper radiance measurements. The L2 SO<sub>2</sub> product provides volcanic and anthropogenic Sulfur Dioxide (SO<sub>2</sub>) retrievals from NM instrument measurements. Processed using the GSFC Principal Component Analysis (PCA) trace gas retrieval algorithm, the SO<sub>2</sub> product offers great consistency with the NASA standard Aura/Ozone Monitoring Instrument (OMI) SO<sub>2</sub> product that also uses the same PCA algorithm. The PCA-based SO<sub>2</sub> product provides continuity between OMI and the follow-up OMPS instrument on board the NOAA-20 (JPSS-1) satellite.

The SPA functions in two modes: standalone, or as an IPOPP plug-in.

### **Software Version**

Version 1.6 of the DRL algorithm wrapper was used to package the SPA described in this document. The algorithm has been ported from version 2.6.9.

Enhancements to this SPA include:

- improved sensitivity to reduce false detections;
- improved twilight pass processing to eliminate errors by downstream algorithms within IPOPP.

This software will execute on a 64-bit computer. This software has been tested on a computer with 32GB of RAM and a CentOS 7 Linux X86\_64 operating system.

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### **Credits**

The OMPSnadir algorithm was provided to the DRL by the Ozone Science Investigator-led Processing System (SIPS). The DRL has enhanced the software package to improve its portability across various Linux platforms.

### **Prerequisites**

To run this package, you must have the Java Development Kit (JDK) or Java Runtime Engine (JRE) (Java 1.6.0\_25 or higher) installed on your computer, and have the Java installation bin/ subdirectory in your PATH environment variable.

This package contains 64-bit binaries statically pre-compiled on an x86-compatible 64-bit computer running under CentOS 7, using gcc 4.8.

### **Program Inputs and Outputs**

The OMPSnadir algorithm takes as input eight files in PDS format:

- APID 0008 construction record (filename P1570008\*0.PDS);
- APID 0011 construction record (filename P1570011\*0.PDS)
- APID 0008 packet (filename P1570008\*1.PDS);
- APID 0011 packet (filename P1570011\*1.PDS);

- APID 0560 construction record (filename P1570560\*0.PDS);
- APID 0561 construction record (filename P1570561\*0.PDS);
- APID 0560 packet (filename P1570560\*1.PDS);
- APID 0561 packet (filename P1570561\*1.PDS).

**NOTE:** The OMPS PDS inputs may be created with the DRL's Real-time Software Telemetry Processing System (RT-STPS), v6.0 or later, available at:  
<https://directreadout.sci.gsfc.nasa.gov/?id=software>

The OMPSnadir algorithm also requires leapsec and utcpole ancillary data files. It creates nine output files:

- OMPS Nadir Mapper (NM) Earth View (EV) L1A (OMPS-NPP\_NMEV\_L1A);
- OMPS Nadir Mapper (NM) Earth View (EV) L1B (OMPS-NPP\_NMEV\_L1B);
- OMPS Nadir Mapper (NM) Total Column Ozone (TO3) L2 (OMPS-NPP\_NMTO3-L2);
- OMPS Nadir Mapper (NM) Total SO<sub>2</sub> L2 (OMPS-NPP\_NMSO2\_PCA\_L2);
- OMPS Nadir Profiler (NP) Earth View (EV) L1A (OMPS-NPP\_NPEV\_L1A);
- OMPS Nadir Profiler (NP) Earth View (EV) L1B (OMPS-NPP\_NPEV\_L1B);
- PNG image for Ozone;
- PNG image for Reflectivity at 331nm;
- PNG image for Ultraviolet Aerosol.

The data output files are in HDF5.

## Installation and Configuration

**NOTE:** Due to limited resources, as well as the many variables that impact scientific integrity and algorithm stability, the DRL will soon no longer support the Standalone Mode for SPA processing. We strongly encourage you now to run SPAs in IPOPP Mode exclusively, that is, from within the IPOPP processing framework. IPOPP will autonomously:

- discover and register raw sensor data;
- retrieve ancillaries from the DRL's real-time and archived ancillary repositories;
- register ancillaries in its Ancillary File Cache;
- schedule SPA executions;
- fulfill science data/ancillary requests from SPAs;
- generate science data products; and
- manage the IPOPP file system.

## Installing into an IPOPP Framework:

This SPA can be installed dynamically into an IPOPP framework to automate production of OMPSnadir data products.

The SPA installation process will install its SPA service(s) into IPOPP. An SPA service is an IPOPP agent that provides the mechanism necessary for running an SPA automatically within the IPOPP framework. Once this SPA is installed, users must enable the SPA service(s) corresponding to this SPA along with any other prerequisite SPA service(s). Instructions for installing an SPA and enabling its services are contained in the IPOPP User's Guide (available on the DRL Web Portal). The SPA services associated with this SPA are listed in Appendix A.

## **Installing as a Standalone Application:**

### **NOTES:**

1. If you have a previous version of this SPA installed, delete the SPA/<SPAname> directory before decompressing and un-archiving the new SPA tar file.
2. The time zone of the underlying Linux installation must be set to UTC. Check this setting using the `timedatectl` command:

```
$ timedatectl
    Local time: Tue 2020-01-14 20:44:56 UTC
    Universal time: Tue 2020-01-14 20:44:56 UTC
    RTC time: Tue 2020-01-14 20:44:56
    Time zone: Etc/UTC (UTC, +0000)
    NTP enabled: yes
    NTP synchronized: yes
    RTC in local TZ: no
    DST active: n/a

$
```

Download the `OMPSNADIR_2.6.9_SPA_1.6.tar.gz` and `OMPSNADIR_2.6.9_SPA_1.6_testdata.tar.gz` (optional) files into the same directory.

Decompress and un-archive the `OMPSNADIR_2.6.9_SPA_1.6.tar.gz` and `OMPSNADIR_2.6.9_SPA_1.6_testdata.tar.gz` (optional) files:

```
$ tar -xzf OMPSNADIR_2.6.9_SPA_1.6.tar.gz
$ tar -xzf OMPSNADIR_2.6.9_SPA_1.6_testdata.tar.gz
```

This will create the following subdirectories:

- SPA
  - OMPSnadir
    - algorithm
    - ancillary
    - station
    - testdata
    - testscripts
    - wrapper

## Software Package Testing and Validation

The testscripts subdirectory contains test scripts that can be used to verify that your current installation of the SPA is working properly, as described below. Note that the optional OMPSNADIR\_2.6.9\_SPA\_1.6\_testdata.tar.gz file is required to execute these testing procedures.

*Step 1:* cd into the testscripts directory.

*Step 2:* There are scripts named run\_OMPSnadir\_normal.sh and run\_OMPSnadir\_dir.sh inside the testscripts directory.

The \_normal.sh script runs the algorithm on the data in the testdata/input directory, creating output files in the testdata/output directory.

The \_dir.sh script takes two parameters, an input directory and an output directory. It expects to see input data and ancillary files in the input directory, following normal naming conventions for those files, and it creates output files in its output directory

To run the OMPSnadir algorithm, use

```
$ ./run_OMPSnadir_normal.sh
```

A successful execution usually takes several minutes, depending on the speed of your computer and the size of the input. If everything is working properly, the scripts will terminate with a message such as:

Output ompsnadir.nml1aev.h5 is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NMEV-L1A.h5

Output ompsnadir.nml1bev.h5 is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NMEV-L1B-p000.h5

Output ompsnadir.nmto3.h5 is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NMTO3-L2.h5

Output ompsnadir.ozone.png is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NMTO3-L2-Ozone-Image.png

Output ompsnadir.reflectivity.png is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NMTO3-L2-Reflectivity331-Image.png

Output ompsnadir.uvaerosol.png is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NMTO3-L2-UVAerosolIndex-Image.png

Output ompsnadir.nmso2pca.h5 is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NMSO2-PCA-L2.h5

Output ompsnadir.npl1aev.h5 is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NPEV-L1A.h5

Output ompsnadir.npl1bev.h5 is /home/ipopp/drlwork/SPA/OMPSnadir/testdata/output/OMPS-NPP\_NPEV-L1B-p000.h5

You can `cd` to the output directory to verify that the science products exist. Test output product(s) are available for comparison in the `testdata/output` directory. These test output product(s) were generated on a 64-bit PC architecture computer running Centos 7. The output products serve as an indicator of expected program output. Use a comparison utility (such as `diff`, `h5diff`, etc.) to compare your output product(s) to those provided in the `testdata/output` directories.

Locally generated files will differ slightly from the provided output files because of differences in machine architecture or operating systems, and because some data fields contain the date when the algorithm was run, or file pathnames from the current installation. Differences in these fields are normal:

- Attributes
  - `/LocalGranuleID`
  - `/ProductionDateTime`
  - `/ProfileID`
  - `/date_created`
  - `/history`
  - `/BinScheme1/ScienceData/PixelQualityFlags/flag_masks`
  - `/InputPointer`
- Datasets
  - `/InputPointers/ControlFileContents`

If there is a problem and the code terminates abnormally, the problem can be identified using the log files. Log files are automatically generated within the directory used for execution. They start with `stdfile*` and `errfile*`. Other log and intermediate files may be generated automatically within the directory used for execution. They are useful for traceability and debugging purposes. However, it is strongly recommended that users clean up log files and intermediate files left behind in the run directory before initiating a fresh execution of the SPA. Intermediate files from a previous run may affect a successive run and produce ambiguous results. Please report any errors that cannot be fixed to the DRL.

## Program Operation

In order to run the package using your own input data, you can either use the run scripts within the wrapper subdirectories, or modify the test scripts within the `testscripts` subdirectory.

## To Use the Run Scripts

**Identify the 'run' scripts:** The wrapper directory within this package contains one subdirectory named `OMPSnadir`. The subdirectory contains an executable called `'run'`. Execute `'run'` within the correct wrapper subdirectory to generate the corresponding product. For instance, the `'run'` within `wrapper/OMPSnadir` is used for creating `OMPSnadir` outputs. Note that to execute `'run'`, you need to have java on your path.

**Specify input parameters using <label value> pairs:** To execute the 'run' scripts, you must supply the required input and output parameters. Input and output parameters are usually file paths or other values (e.g., a scan time parameter). Each parameter is specified on the command line by a <label value> pair. Labels are simply predefined names for parameters. Each label must be followed by its actual value. Each process has its own set of <label value> pairs that must be specified in order for it to execute. Some of these pairs are optional, meaning the process would still be able to execute even if that parameter is not supplied. The two types of <label value> pairs that the OMPSNADIR\_SPA uses are:

- a) Input file label/values. These are input file paths. Values are absolute or relative paths to the corresponding input file.
- b) Output file label/values. These are output files that are produced by the SPA. Values are absolute or relative paths of the files you want to generate.

The following tables contain labels, and their descriptions, required by the OMPSNADIR\_SPA.

Input File Labels	Description	Source
APID008.0.pds APID011.0.pds APID008.1.pds APID011.1.pds	SNPP spacecraft Level 0 (PDS) file	<ol style="list-style-type: none"> <li>1. RT-STPS v6.0 or later can be used to create these OMPS PDS products.</li> <li>2. Real-time spacecraft PDS products over the eastern US region are available at <a href="https://is.sci.gsfc.nasa.gov/gsfcddata/npp/spaceraft/level0">https://is.sci.gsfc.nasa.gov/gsfcddata/npp/spaceraft/level0</a></li> </ol>
APID560.1.pds APID561.1.pds	OMPS normal resolution Level 0 (PDS) file	<ol style="list-style-type: none"> <li>1. RT-STPS v6.0 or later can be used to create these OMPS PDS products.</li> <li>2. Real time OMPS PDS products over the eastern US region are available at <a href="https://is.sci.gsfc.nasa.gov/gsfcddata/npp/omps/level0">https://is.sci.gsfc.nasa.gov/gsfcddata/npp/omps/level0</a></li> </ol>
APID560.0.pds APID561.0.pds	OMPS construction record Level 0 (PDS) files	<ol style="list-style-type: none"> <li>1. RT-STPS v6.0 or later can be used to create these OMPS PDS products.</li> <li>2. Real time OMPS PDS products over the eastern US region are available at <a href="https://is.sci.gsfc.nasa.gov/gsfcddata/npp/omps/level0">https://is.sci.gsfc.nasa.gov/gsfcddata/npp/omps/level0</a></li> </ol>
leapsec	leapsec file	For recent leapsec files, go to: <a href="https://is.sci.gsfc.nasa.gov/ancillary/temporal">https://is.sci.gsfc.nasa.gov/ancillary/temporal</a>
utcpole	utcpole file	For recent utcpole files, go to: <a href="https://is.sci.gsfc.nasa.gov/ancillary/temporal">https://is.sci.gsfc.nasa.gov/ancillary/temporal</a>
npp_omps_nmdrk_luts (Optional)	OMPS Total Column DRK LUT	<p>For recent LUTs, go to: <a href="https://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/omps/">https://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/omps/</a></p> <p>For archived LUTs, go to: <a href="https://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/omps/">https://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/omps/</a></p>



		<p>File names are of the form:  OMPS-NPP_NM-DRK-  p05*_vV.V_yyyyMMddthmmss_*.h5<sup>1</sup></p>
npp_omps_npdrk_luts (Optional)	OMPS Nadir Profile DRK LUT	<p>For recent LUTs, go to:  <a href="https://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/omps/">https://is.sci.gsfc.nasa.gov/ancillary/LUTs/npp/omps/</a></p> <p>For archived LUTs:  <a href="https://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/omps/">https://is.sci.gsfc.nasa.gov/ArchivedAncillary/LUTs/npp/omps/</a></p> <p>File names are of the form:  OMPS-NPP_NP-DRK-  p05*_vV.V_yyyyMMddthmmss_*.h5<sup>1</sup></p>

Output File Labels	Description	Destination (when SPA is installed in IPOPP) <sup>2</sup>
ompsnadir.nml1aev.h5	OMPS Nadir Mapper (NM) Earth View (EV) L1A (OMPS-NPP_NMEV_L1A) output HDF file path	pub/gsfcddata/npp/omps/level1/OMPS-NPP_NMEV-L1A_v2.0_yyyyMMddthhmmss*.h5 <sup>1</sup>
ompsnadir.nml1bev.h5	OMPS Nadir Mapper (NM) Earth View (EV) L1B (OMPS-NPP_NMEV_L1B) output HDF file path	pub/gsfcddata/npp/omps/level1/OMPS-NPP_NMEV-L1B-p000_v2.0_yyyyMMddthhmmss*.h5 <sup>1</sup>
ompsnadir.nmto3.h5	OMPS Nadir Mapper (NM) Total Column Ozone (TO3) L2 (OMPS-NPP_NMTO3-L2) output HDF file path	pub/gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2_v2.1_yyyyMMddthhmmss*.h5 <sup>1</sup>
ompsnadir.nmso2pca.h5	OMPS Nadir Mapper (NM) Total SO <sub>2</sub> L2 (OMPS_NPP_NMSO2_PCA_L2) output HDF file path	pub/gsfcddata/npp/omps/level2/OMPS-NPP_NMSO2-PCA-L2_v1.1_yyyyMMddthhmmss*.h5 <sup>1</sup>
ompsnadir.npl1aev.h5	OMPS Nadir Profiler (NP) Earth View (EV) L1A (OMPS-NPP_NPEV_L1A) output HDF file path	pub/gsfcddata/npp/omps/level1/OMPS-NPP_NPEV-L1A_v2.0_yyyyMMddthhmmss*.h5 <sup>1</sup>
ompsnadir.npl1bev.h5	OMPS Nadir Profiler (NP) Earth View (EV) L1B (OMPS-NPP_NPEV_L1B) output HDF file path	pub/gsfcddata/npp/omps/level1/OMPS-NPP_NPEV-L1B-p000_v2.0_yyyyMMddthhmmss*.h5 <sup>1</sup>
ompsnadir.ozone.png	Total Column Ozone PNG file path	pub/gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2-Ozone-Image_v2.1_yyyyMMddthhmmss*.png <sup>1</sup>
ompsnadir.reflectivity.png	Reflectivity at 331nm PNG file path	pub/gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2-Reflectivity331-Image_v2.1_yyyyMMddthhmmss*.png <sup>1</sup>
ompsnadir.uvaerosol.png	UV aerosol PNG file path	pub/gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2-UVAerosolIndex-Image_v2.1_yyyyMMddthhmmss*.png <sup>1</sup>

<sup>1</sup>Where yyyy, MM, dd, hh, mm, ss represent the year, month, day of month, hour, minutes, and seconds of a timestamp, and V.V represents the version number of LUT files.

<sup>2</sup>Destination paths are relative to the IPOPP data directory. Prior to IPOPP 2.5, this was /raid. For IPOPP 2.5 and later, this defaults to \$HOME/drl/data, and can be changed at IPOPP install time.

**Execute the 'run':** The following script shows an example of a command line to run the OMPSnadir algorithm from the testscripts directory:

```
../wrapper/OMPSnadir/run \
  APID008.0.pds ../testdata/input/P1570008AAAAAAAAAAAAAS18135181934000.PDS \
```

```

APID008.1.pds ../testdata/input/P1570008AAAAAAAAAAAAAAS18135181934001.PDS \
APID011.0.pds ../testdata/input/P1570011AAAAAAAAAAAAAAS18135181934000.PDS \
APID011.1.pds ../testdata/input/P1570011AAAAAAAAAAAAAAS18135181934001.PDS \
APID560.0.pds ../testdata/input/P1570560AAAAAAAAAAAAAAS18135181934000.PDS \
APID560.1.pds ../testdata/input/P1570560AAAAAAAAAAAAAAS18135181934001.PDS \
APID561.0.pds ../testdata/input/P1570561AAAAAAAAAAAAAAS18135181934000.PDS \
APID561.1.pds ../testdata/input/P1570561AAAAAAAAAAAAAAS18135181934001.PDS \
leapsec ../testdata/input/leapsec.dat.2018062232204 \
utcpole ../testdata/input/utcpole.dat.2018062232204 \
npp_omps_nmdrk_luts ../testdata/input/OMPS-NPP_NM-DRK-
p051_v2.0_2018m0515t125147_o3
3925_2018m0515t175317.h5 \
npp_omps_npdrk_luts ../testdata/input/OMPS-NPP_NP-DRK-
p051_v2.0_2018m0515t125147_o3
3925_2018m0515t175122.h5 \
ompsnadir.nml1aev.h5 ../testdata/output/OMPS-NPP_NMEV-L1A.h5 \
ompsnadir.nml1bev.h5 ../testdata/output/OMPS-NPP_NMEV-L1B-p000.h5 \
ompsnadir.nmto3.h5 ../testdata/output/OMPS-NPP_NMTO3-L2.h5 \
ompsnadir.ozone.png ../testdata/output/OMPS-NPP_NMTO3-L2-Ozone-Image.png \
ompsnadir.reflectivity.png ../testdata/output/OMPS-NPP_NMTO3-L2-Reflectivity331-Ima
ge.png \
ompsnadir.uvaerosol.png ../testdata/output/OMPS-NPP_NMTO3-L2-UVAerosolIndex-
Image.png \
ompsnadir.nmso2pca.h5 ../testdata/output/OMPS-NPP_NMSO2-PCA-L2.h5 \
ompsnadir.npl1aev.h5 ../testdata/output/OMPS-NPP_NPEV-L1A.h5 \
ompsnadir.npl1bev.h5 ../testdata/output/OMPS-NPP_NPEV-L1B-p000.h5

```

A successful execution usually requires several minutes, depending on the speed of your computer and the size of the input. If execution fails, you will see an error message indicating the cause of failure (e.g., a file cannot be found, or a label cannot be recognized). Correct it and run again. If the problem has some other cause, it can be identified using the log files. Log files are automatically generated within the directory used for execution. They start with stdfile\* and errfile\* and can be deleted after execution. Other log and intermediate files may be generated automatically within the directory used for execution. They are useful for traceability and debugging purposes. However, it is strongly recommended that users clean up log files and intermediate files left behind in the run directory before initiating a fresh execution of the SPA. Intermediate files from a previous run may affect a successive run and produce ambiguous results. The 'run' can be executed from any directory the user chooses. This can be done by prefixing it with the file path for the 'run' script.

## NOTES:

1. Use the latest leapsec and utcpole ancillaries available on DRL's ancillary repository (refer to the input file label table on page 7). It is recommended to use leapsec and utcpole input files that are not more than 14 days old.

2. Use NM\_DRK and NP\_DRK LUTs that are closest but prior to the start of the swath. If no LUT files are supplied (parameters `npp_omps_nmdrk_luts` and `npp_omps_npdrk_luts`), the wrapper will default them to internal LUT files.
3. The data products generated by this SPA may be visualized with the DRL's H2G\_SPA (Hierarchical Data Format [HDF] to Georeferenced Tagged Image File Format [GeoTIFF] Converter Science Processing Algorithm). H2G is designed specifically for Direct Readout applications to create geolocated GeoTIFF images, jpeg browse images, and png browse images for parameter datasets in SNPP products and EOS products. H2G\_SPA and its User Guide are available for download from the DRL Web Portal. Please refer to Appendix A for information on enabling image production for this SPA in IPOPP. Processing the outputs of this SPA with H2G requires H2G Version 2.5 with Patch 1 or later, with all available patches applied.

### **To Use the Scripts in the testscripts Directory**

One simple way to run the algorithms from the directory of your choice using your own data is to use the `run_OMPSnadir_dir.sh` script. It takes two arguments:

- a path to a directory containing a set of input files (PDS data and construction records, leapsec, utcpole, and LUTs)
- a path to a directory where the output files will be created.

For the input file naming conventions and the output file names, see the script.

If you need more control than the `run_OMPSnadir_dir.sh` script gives, copy the `run_OMPSnadir_normal.sh` script from the testscripts directory to the selected directory. Change the values of the variables like `WRAPPERHOME`, `INPUTHOME` and `OUTPUTHOME` to reflect the file paths of the wrapper directories and the input/output file paths. Then modify the input/output file name variables. Run the script to process your data.

## Appendix A SPA Services

Installation of this SPA in IPOPP mode will make the SPA services listed in Table A-1 available to IPOPP. These SPA services along with any other prerequisite SPA services (listed in Table A-2) will need to be enabled to allow IPOPP to automate production of the OMPSnadir data products. Furthermore, users who wish to generate image products from the data products generated by this SPA will need to enable the image-generating SPA services listed in Table A-3. The SPAs containing the prerequisite and the image-generating SPA services listed in Tables A-2 and A-3 can be downloaded from the DRL Web Portal, in case they are not already available in your IPOPP installation. Details about these other SPAs are available in the respective SPA User's Guide. Please refer to the IPOPP User's Guide for instructions on how to install an SPA in IPOPP and enable the corresponding SPA services.

**Table A-1. SPA Services**

SPA Services	Data Products Produced	
OMPSnadir -normal	<b>Product Name</b>	<b>Destination (from \$HOME/drl/data/pub)</b>
	OMPS Nadir Mapper (NM) Earth View (EV) L1A (OMPS-NPP_NMEV_L1A)	gsfcddata/npp/omps/level1/OMPS-NPP-NMEV-L1A_v2.0_starttime_orbit_creationtime.h5 <sup>1</sup>
	OMPS Nadir Mapper (NM) Earth View (EV) L1B (OMPS-NPP_NMEV_L1B)	gsfcddata/npp/omps/level1/OMPS-NPP-NMEV-L1B-p000_v2.0_starttime_orbit_creationtime.h5 <sup>1</sup>
	OMPS Nadir Mapper (NM) Total Column Ozone (TO3) L2 (OMPS-NPP_NMTO3-L2)	gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2_v2.1_starttime_orbit_creationtime.h5 <sup>1</sup>
	OMPS Nadir Mapper (NM) Total SO <sub>2</sub> L2 (OMPS_NPP_NMSO2_PCA_L2 )	gsfcddata/npp/omps/level2/OMPS-NPP-NMSO2-PCA-L2_v1.1_starttime_orbit_creationtime.h5 <sup>1</sup>
	OMPS Nadir Profiler (NP) Earth View (EV) L1A (OMPS-NPP_NPEV_L1A)	gsfcddata/npp/omps/level1/OMPS-NPP-NPEV-L1A_v2.0_starttime_orbit_creationtime.h5 <sup>1</sup>
	OMPS Nadir Profiler (NP) Earth View (EV) L1B (OMPS-NPP_NPEV_L1B)	gsfcddata/npp/omps/level1/OMPS-NPP-NPEV-L1B-p000_v2.0_starttime_orbit_creationtime.h5 <sup>1</sup>
	Total Column Ozone PNG	gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2-Ozone-Image_v2.1-

		<i>starttime-oorbit-creationtime.png</i> <sup>1</sup>
	Reflectivity at 331nm PNG	gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2-Reflectivity331-Image_v2.1_ <i>starttime-oorbit-creationtime.png</i> <sup>1</sup>
	UV aerosol PNG	gsfcddata/npp/omps/level2/OMPS-NPP_NMTO3-L2-UVAerosolIndex-Image_v2.1_ <i>starttime-oorbit-creationtime.png</i> <sup>1</sup>
<sup>1</sup> <i>starttime</i> is a time stamp for the start of swath. <i>creationtime</i> is a time stamp for when the product was created. They are formatted as <i>yyyyMMddTHHmmss</i> , where <i>yyyy</i> is the year, <i>MMdd</i> are the month and day, and <i>HHmmss</i> are the hour, minute and second. <i>orbit</i> is the orbit number, formatted as five digits - 00001.		

**Table A-2. Prerequisite SPA services**

Prerequisite SPA services	SPA in which they are available
None. (Use IPOPP to ingest OMPS PDS files. Refer to the IPOPP User's Guide. The Real-time Software Telemetry Processing System [RT-STPS], v6.0 or later, can be used to create OMPS PDS files.)	N/A

**Table A-3. Image-generating SPA services**

Image-generating services	SPA in which they are available
ompsaot-geotiff	H2G_SPA
ompsrefl331-geotiff	H2G_SPA
ompssso2-geotiff	H2G_SPA
ompstozone-geotiff	H2G_SPA

**NOTE:** Please refer to the H2G\_SPA User's Guide for more details about the image products, including their locations and filename patterns when they are generated in IPOPP.